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A Psychometric Study for Developing a Closure Flexibility Scale Using Item Response Theory (IRT)

Dissertation Submitted for the Master Degree in Education
(Educational psychology)

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Summary Of The Study

Title: A Psychometric Study For Developing a Closure Flexibility Scale Using Item Response Theory (IRT).

Aims: The study aimed at developing closure flexibility scale, calibrating two copying tests items on new scale using Rasch model.

The importance of study:

The importance of the study can be defined in the following:

First: The Theoretical Importance:

First: the importance of the theory, as follows:

1. The present study may contribute in building the tools listed on the unity of scale to the ability of flexible closure.
2. Achieve the substantive objectives of the measure through the Calibration of the Copying Scale in the light of contemporary trends of the measure (Rasch model).
3. Achieve a high degree of Validity (Content Validity) by deleting the items are appropriate according to the Criteria for Infit and Outfit , which may measure another variable or by a defect in the Building.
4. Different scale items online for the same variable contributes to the building standards have a high degree of stability for individuals and items which is in addition to measuring instruments in the field of psychology.
5. Providing Test Forms Equating to measure the flexible closure Ability provides the tools to measure ability estimates non depending on a items.

6. The Rasch model has linear measurement provides an opportunity to assess the difficulty of items and the individual's ability with unit of measurement of knowledge, thus achieving the measurement accuracy and objectivity

Second: Applied important:

The estimation of the ability of flexible closure with objectively help:

1. Diagnosed with learning difficulties learners which is a useful tool for the work of psychologist.
2. Predict the cognitive style of the student, which reflects its impact in the selection of appropriate teaching methods.
3. Evaluation of training programs (pre measurement, post measurement) using images Equating measurement which helps to overcome the problem of familiarity test.
4. Saving time and effort the researcher and the research sample through the preparation of a summary of the measure to assess the ability.

Problem of the study: problem can be Stated in the following questions:

1. To what extent can the copying test items be calibrated on a common calibrating scale using Rasch model?
2. What are the interpretation for deleting some items according to unfit and outfit criteria?
3. How can we interpret deleing some participants from the calibration sample according to unfit and outfit criteria?

4. What are the individual abilities equivalent for every raw score on the final copying test?
5. What is the information we got from the final copying test
6. To what extent is the copying test valid and reliable?
7. What are the percentiles and T values for the final copying test?
8. What is the calibration for the two re taken from the copying test through common persons?
9. Do item difficulties differ in the two tests?
10. What are the persons; abities equivalent for every possible score in the two test?
11. What is the information we got from every form of the tests?

Study Terms:

Visual attention:

The ability of investigating the visual filed ;it includes some cognitive processes such discrimination, visual closure, spatial perception, composing mental representation for unfamiliar stimulus, retention recalling and processing these representation to be used after that.

Closure flexibility: the ability to mentally retain a visual stimulus for abstracting it from another perceived material

Test Calibration:

Developing a unit scale for an ability according to every item difficlkuties, so that every ability would be defined on continuous scale using a defined measurement unit and a common zero.

4. **Equating Tests:** tests on which persons abilities are not affected by their performance in them as all their items are calibrated on one scale.

Method:

Sample:

A. **Reference scale calibration sample:** participants were 415 students from faculty of Education, Fayoum university , their age mean was 18.79 and SD was 0.764

B. **Norm's sample**: Paticipants were 388 students from faculty of Education, Fayoum University. They were of there age levels: 18, 19, 20 years.

Material:

Copying test: it includes two subtests, every one includes 32 items.

Procedures:

1. Polite study
1. Administration of the tests
2. Correcting and data analysis
3. Calibrating the reference copying test
4. Determining the validity and reliability of the final test
5. Calculating the norms which interpret the ability of the persons
6. Calibrating the two test items according to reference copying scale using t common persons, getting the new difficulties of the items in logits and transforming them to MNF unit.

Statistics:

IMB Spas (19) and Insteps (3.67) were used in performing the statistical treatment of Rasch model for answering the study questions.

Results:

1. The copying tests were calibrated on a common scale using the Rasch model; the range of difficulty was form 1.94- to 3.64 logit, equivalent to 40 to 68 MNF.
2. Deleting 17 participants from the calibration sample according to the unfit and outfit criteria, the responses were interpreted according the guessing and carelessness factors.

3. Deleting 8 items of the copying scale according to the unfit and outfit criteria because some items are problematic and there were not valid.
4. Getting a table for the ability assessment for every total score on the reference copying scale, ranging from 5.8- and 6.12 logit, equivalent to 21 to 80.6 MNF.These kines are the exteremist of the ability which can be assessed using the copying test
5. The tests proved to be valid and reliable either in assessing the person's abilities or in assessing the items difficulties. The reliability values for the individual abilities was 0.9, and for the difficulties was 0.98
6. Calculating the scale norms using Rasch model through getting the percentiles and the t scores which reflect the individuals abilities for the three age groups, the percentiles 25, 50, 75 were equivalent to 44, 49, 56 t scores consequently
7. Calibrating the items of every test using some common persons, the first test covers a range of 2.04- to 3 logit, equivalent to 39.8 to 38 MNF, while the range of the difficulties for the second test was form 1.96- to 3.75 logit which is equivalent to 40.2 to 68.75 MNf.
8. Drawing a table for assessing the abilities equivalent to every possible total score in the two tests. The range of the first version abities was from 5- to 5.26 , equal to 25 to 76 logit MNF, and for the second test 5.26- t5.54 logit equivalent to 24 to 78 MNF.

Abstract

Researcher: Gomaa Said Mohamed Abdelhamid

Title: A Psychometric Study For Developing a Closure Flexibility Scale Using Item Response Theory (IRT).

Aims: The study aimed at developing closure flexibility scale, calibrating two copying tests items on new scale using Rasch model.

Sample: participants were 415 students from faculty of Education, Fayoum university , their age mean was 18.79 and SD was 0.764 and calculated Norm on a sample of 388[1] individuals From calibration sample.

Study Tools: it includes two subtests, every one includes 32 items..

Statistics: IMB Spas (19) and Insteps (3.67) were used in performing the statistical treatment of Rasch model for answering the study questions.

The Most Important Results of the Study:

- The copying tests were calibrated on a common scale using the Rasch model; the range of difficulty was form 1.94- to 3.64 logit, equivalent to 40 to 68 MNF.
- Deleting 17 participants from the calibration sample according to the unfit and outfit criteria, the responses were interpreted according the guessing and carelessness factors.
- Deleting 8 items of the copying scale according to the unfit and outfit criteria because some items are problematic and there were not valid. Creating a table to calculate the estimates of the ability corresponding to each a total raw degree on a reference to copying scale, ranging from (-5.8) to (6.12) with logit unit or from (21) to (80.6) with MNF unit.
- Getting a table for the ability assessment for every total score on the reference copying scale, ranging from 5.8- and 6.12 logit, equivalent to 21 to 80.6 MNF.

[1] Where deleted from the basic sample (415 individuals) 17 individuals according fit Criteria, and also deleted 10 members did not seem to collaborating with a researcher at the completion of their data as a date of birth, so Norms were calculated on 388 individuals

- The tests proved to be valid and reliable either in assessing the person's abilities or in assessing the items difficulties. The reliability values for the individual abilities was 0.9, and for the difficulties was 0.98.
- Calculating the scale norms using Rasch model through getting the percentiles and the t scores which reflect the individuals abilities for the three age groups, the percentiles 25, 50, 75 were equivalent to 44, 49, 56 t scores consequently
- Calibrating the items of every test using some common persons, the first test covers a range of 2.04- to 3 logit, equivalent to 39.8 to 38 MNF, while the range of the difficulties for the second test was form 1.96- to 3.75 logit which is equivalent to 40.2 to 68.75 MNf.
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